affecting the safety of the ship, provided they were not so situated as to cause the ends to be submerged, or the ship to capsize." It is surely, however, the object of the naval constructor to obtain such a relation between water-tight subdivision and the stability of a ship, both transverse and longitudinal, as would prevent capsizing, or going down head or stern first, if a few small compartments were filled wherever these might be situated. With regard to bilge keels, also, it is stated that they are generally fitted for about two-thirds of the length of a ship. The usual length is, however, from one-third to one-half.

It might appear hypercritical to call attention to such points as the above when dealing with a work that is so well adapted for the elementary purposes which the authors designed it to serve; especially as these do not affect the principal lessons that deal with those mechanical details and elements of construction that junior students require to be instructed upon. We can recommend the book to the diligent attention of those for whom it has been prepared.

OUR BOOK SHELF.

The Yoruba-speaking Peoples of the Slave Coast of West Africa; their Religion, Manners, Customs, Laws, Language, &c. With an appendix containing a comparison of the Tshi, Ga, Ewe, and Yoruba Languages. By A. B. Ellis. (London: Chapman and Hall, 1894.)

THE late Colonel Ellis, whose death was almost simultaneous with the publication of this book, had devoted long and earnest attention to the study of the West African tribes, amongst which his military duties led him. This volume completes and brings into focus his life-work. Like the previous volumes on the Tshi- and the Ewe-speaking peoples, it is a contribution to anthropology of the very highest order, combining the enthusiasm of a student and the literary power of a cultured scholar with the simple and unobtrusive directness of the soldier. Colonel Ellis touches no controversy, and records, with no more commentary than is necessary to do justice to the narrative, the facts of his own observation. The book begins with an excellent geographical and historical summary of the Yoruba country and people, goes on to consider their deities, priests and superstitions, and the laws and customs which prevail, and concludes with the citation of 250 Yoruba proverbs, many of them worthy mates of those of Solomon, and a series of folk-lore tales, in which we see the origin of many of "Uncle Remus's" best stories.

As the Tshi tribes represented the lowest stage of primitive culture, the Yoruba represent the highest, having fairly emerged from animism into polytheism. The similarities in their mythology to that of the Greeks, and in their customs to those of the early Hebrews, are in many instances remarkably close. In municipal government they show considerable enlightenment, having a female functionary, the "Mistress of the Streets," to deal with all disputes between women, only those which she is unable to settle being passed on to the *Bale* or civil governor. They are observant of the phenomena of nature, calling Sirius the canoe star, as it is believed to be a guide to canoe-men. The Milky Way is called "the group of chickens," the clearer stars being the hens; while Venus, according to the position in which it appears, is known as the morning or evening star, or when near the moon as "the moon's dog." The Yoruba calendar is based on the lunar month, and it is interesting to note that while the Tshi- and Ga-speaking people divide this period into four weeks of seven days with some odd hours, the Yorubas count six weeks of five days minus a few hours. All the tribes commence the reckoning of the day with the evening, the first day of each month being reckoned from the appearance of the new moon. The first day of each group of five is held as a day of rest, and looked upon as generally unlucky; but the follower of each of the recognised gods must observe another day of rest also, on which those not worshipping the same deity are at liberty to work.

The appendix to the book is an elaborate philological treatise in the form of a comparison of the grammar and vocabularies of all those West African languages which Colonel Ellis had minutely studied.

A Handbook to the Study of Natural History, for the use of Beginners. By various authors. (London: George Philip and Son, 1894.)

STUDENTS of science are usually inspired with the desire to create in others an enthusiasm for the pursuit of natural knowledge. This fact probably explains why so many books of mediocre quality are foisted upon the public. Lady Isabel Margesson, who has edited the book under review, had the laudable ambition of "putting before the Beginner a clue to the many paths of the somewhat bewildering labyrinth called Natural Science." To carry out her idea, she procured persons to write short descriptions which could be used as finger-posts pointing the way to the acquisition of knowledge concerning all manner of living things, of minerals, &c., and, to the whole, Sir Mountstuart Grant Duff has contributed an introduction, in which he expatiates upon the book's inception and the qualifications of the authors of the various parts. Lady Isabel's plan may appear excellent in the abstract, but its realisation is not deserving of much praise. We venture to say that there is scarcely a section in the book exactly meeting the requirements of beginners. Scientific names are frequently given without any explanation, and the beginner is led into the maze of botanical nomenclature before he is told how to distinguish the parts of plants. One or two of the authors have confined themselves to describing the spirit in which their branches of natural science should be wooed in order to be won; others give descriptive lists of books suitable for sequential reading; while a third section devote their space to methods of work. When fourteen writers assist in making a book, inequality may be confidently expected. Thus it is that Lady Isabel's idea has not crystallised into a very symmetrical form.

Surveying and Surveying Instruments. (The Specialists Series). By G. A. T. Middleton. (London: Whittaker and Co., 1894).

THE contents of this book have already appeared in a series of articles in the *Building News*, but there is no doubt that in book form they will be found more serviceable to readers in general. The articles in question deal in a practical way with the methods of procedure adopted in surveying, and with the descriptions of the different instruments employed. The first chapter treats of surveys with chains only; here the author gives some very sound advice, and concludes it with a description of a worked-out survey, showing also the method of entering measurements in the field-book. In case of obstructions such as rivers, sheets of water, bog land, &c., modifications in the chain line methods have to be adopted, and these are discussed in chapter ii.; the reader is also brought in contact with right-angle instruments, such as the now comparatively little used cross-staff, the optical square, and Weldon's right-angle prism. Next is described the uses of that very important instrument the level, and the different methods of "levelling" are each dealt with. The numerous worked-out "levellings" with figures, should bring the subject home to the

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reader. The numerous forms of levels require the author to devote chapter iv. to a discussion of their qualities and of their different means of adjustment. This latter point is of the greatest importance to the surveyor, for on this depends to a great extent the accuracy and rapidity with which observations may be made. The chief levels discussed are the so-called "dumpy" and "Y" types, but other hand-levels are referred to, such as Stanley's builder's level, Watson's clinometer level, and Stanley's Abney and Stanley's improved Abney level. Short reference is made to the barometer as a measurer of differences of level.

Chapter v. is devoted to the uses of angle-measuring instruments, such as are employed in the determination of either the main points upon an extensive survey or of inaccessible points. By means of extracts from the field-book and illustrative diagrams, the method of procedure is carefully explained, and many practical hints are in addition interpolated. The following two and last chapters contain detailed accounts of the theodolite, other angle-measuring instruments, and instruments for ascertaining distances; among the last-mentioned being Stanley's tacheometric theodolite, Steward's omni-telemeter, and the Labbez Telemeter.

As a handbook for those employed in the practical work of surveying, the volume should be of great use; its value is greatly enhanced by the very excellent drawings of the numerous instruments which are inserted in the text.

LETTERS TO THE EDITOR.

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The Photography of the Splash of a Drop.

PROF. WORTHINGTON tells me that in his lecture on the splash of a drop, at the Royal Institution, on May 18, he was not able, through want of time, to explain how the photographs were taken, and has suggested to me that a short account of this, which was our joint work, may be of interest.

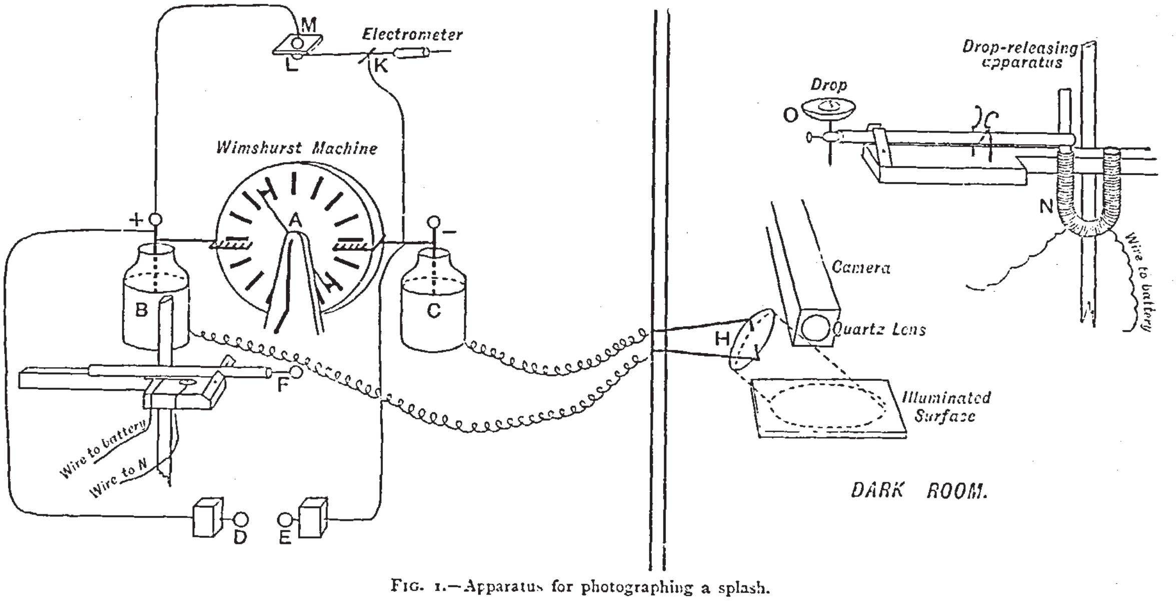

FIG. 1.—Apparatus for photographing a splash.

In our first attempts we employed the spark used by Prof. Worthington many years ago for viewing and making drawings of the phenomenon (*see Proc. Roy. Soc.* No. 222, 1882). This spark was produced by breaking at the surface of mercury a current of high self-induction; but we found that when this was made powerful enough for photographic purposes, it became of too great duration (from 4 to 6 thousandths of a second), so that the drop had time to move appreciably while under illumination. We therefore had recourse to the Leyden jar spark as employed by Lord Rayleigh (NATURE, vol. xliv. p. 249). This is so exceedingly convenient a method of producing a suitably timed spark *at any place* without the necessity of insulating the leading wires, that, for the sake of making it more generally known, I venture to repeat with a simplified diagram the description of the arrangement, though really identical with Lord Rayleigh's.

Prof. Worthington's timing sphere had been of ivory; it was only necessary to substitute a brass ball, and the original timing apparatus was suited to the new conditions. (Fig. 1.)

[1]A is a Wimshurst machine, whose + and − terminals are connected to the inner coats of two large Leyden jars, B and C, the capacity of each being roughly equivalent to that of a glass plate condenser, the area of each surface being 4380 square cm., and the thickness 2 mm. These inner coatings were also connected by insulated wires to two insulated knobs, D and E, between which the timing sphere, F, falls. The jars stand on the same imperfectly-conducting table, and from their outer coatings are led stout uninsulated wires through the partition wall of the dark room, where they terminate in a spark gap, H, between two stout magnesium wires. Here the spark is produced which illuminates the drop. K is a rough electrometer, consisting of a brass sphere, L, carried on a pivoted wire, on which slides a suitable counterpoise; L is connected with the inner coating of one jar, and is attracted towards the oppositely charged sphere, M, connected with the inner coating of the other jar. When the spheres D and E are sufficiently charged for the timing sphere to cause a discharge when it falls between them, L is lifted by the attraction of M and strikes a glass plate which separates them; this is the signal for letting off the drop and timing sphere F. The timing sphere F has been held on a ring carried by a horizontal wooden rod or lever about six inches long, and pivoted about a horizontal axis.

A smart upward fillip throws up the other end of this lever, and leaves the sphere in mid-air free to fall, and simultaneously breaks contact with crossed platinum wires beneath the lever, and breaks the current of the electromagnet, N, in the dark room, thus allowing an india-rubber catapult to toss up, in precisely the same way, one end of a similar lever, whose other end carries a smoked watch-glass, O, on which the drop has been lying without adhesion. Thus drop and sphere are liberated simultaneously,

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[1] The arrangement of jars was, I believe, first used by Dr. Lodge.

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